

**WHAT IS CLAIMED IS:**

1. A configurable voltage generator comprising:  
  
an oscillator module for generating a pumping signal;  
  
a digital to analog (D/A) converter coupled to the oscillator for generating one or more analog signals of a predetermined voltage level based on the pumping signal as configured by a set of inputs thereof; and  
  
a charge pump coupled to the D/A converter for producing a direct current (DC) output based on the analog signals generated by the D/A converter,  
  
wherein one or more outputs are configurable by adjusting the inputs of the D/A converter.
2. The generator of claim 1 further comprising a load capacitor coupled to the charge pump for smoothing the output.
3. The generator of claim 1 wherein the oscillator is a ring oscillator.
4. The generator of claim 3 wherein the pumping signal is a square wave signal.
5. The generator of claim 4 wherein a voltage swing of the square wave signal is within a predetermined operating voltage range.

6. The generator of claim 1 wherein the charge pump is a negative charge pump for generating at least one configurable negative output to be used as a substrate-bias voltage for reducing leakage of a semiconductor device.

7. The generator of claim 1 further comprising a recovery module for clearing the output before generating a new value.

8. The generator of claim 1 wherein the D/A converter further includes an initial control module for initializing the D/A converter.

9. The generator of claim 8 wherein the D/A converter further includes a code converter for transforming the inputs to a set of thermometer signals.

10. The generator of claim 1 wherein the D/A converter is selected with a predetermined number of inputs based on a predetermined number of steps needed for the analog signals generated.

11. The generator of claim 1 wherein the charge pump is a voltage doubler producing the output as a sum of a voltage output swing of the D/A converter and a supply voltage.

12. A configurable voltage generator for providing one or more substrate-bias

voltages for reducing leakage current, the generator comprising:

an oscillator module for generating a square wave pumping signal;

a digital to analog (D/A) converter coupled to the oscillator for generating one or more analog signals of a predetermined voltage level based on the pumping signal as configured by a set of inputs thereof; and

a negative charge pump coupled to the D/A converter for producing a direct current (DC) output based on the analog signals generated by the D/A converter.

13. The generator of claim 12 further comprising a load capacitor coupled to the negative charge pump for smoothing the output.

14. The generator of claim 12 wherein a voltage swing of the square wave pumping signal is within a predetermined operating voltage range.

15. The generator of claim 12 further comprising a recovery module for clearing the output before generating a new value.

16. The generator of claim 1 wherein the D/A converter is selected with a predetermined number of inputs based on a predetermined number of steps needed for the analog signals generated.

17. A method for producing one or more voltages by a configurable voltage

generator for providing one or more substrate-bias voltages for reducing leakage current, the method comprising:

activating an oscillator module for generating a square wave pumping signal;

selecting a set of inputs to a digital to analog (D/A) converter coupled to the oscillator for generating one or more analog signals of a predetermined voltage level based on the pumping signal; and

wherein a negative charge pump coupled to the D/A converter produces a direct current (DC) output based on the analog signals generated by the D/A converter as configured by the selected inputs.

18. The method of claim 17 further comprising smoothing the output by a load capacitor coupled to the negative charge pump.

19. The method of claim 17 further comprising clearing the output before generating a new value.

20. The method of claim 17 further comprising determining a desired substrate-bias voltage based on an optimal effect on the leakage current.